Relation of Meteorological Theories to Aircraft Dispatching

THE AIR LINE PILOT

AIR LEGISLATION NOW BEFORE CONGRESS

UNITED HAS NEW SKYLOUNGE MAINLINER

Vol. 6—No. 2 | Published by The Air Line Pilots Association, International, 3145 W. 63rd St., Chicago, Ill. | January, 1937

AIR TRANSPORTATION SHOULD BE UNDER JURISDICTION I. C. C.—EASTMAN

CURRENT EVENTS

The 75th Congress of the United States is now in session and with the exception of inauguration excitement, things have been rather quiet. However, all indications are for plenty of activity.

Considerable air legislation has already been introduced, including:

AIR LEGISLATION INTRODUCED THIS SESSION

H. R. 1518—Granting double pensions for disability from aviation, submarine, or diving duty.—
January 5 by Mr. Gasque.

H. R. 1569—To provide for lighter-than-air craft for the use of the Coast Guard.—
January 5 by Mr Bland.

H. R. 1670—To authorize the enlargement of Governors Island and consenting to the use of a portion thereof as a landing field for the city of New York and its environs.—
January 5 by Mr. Peyser.

H. R. 2252—Authorizing the loan of $12,000,000 for constructing two eight-million-cubic foot American-designed dirigible airships, a large American airship plant, and an Atlantic operating terminal; and to establish twice-a-week American trans-Atlantic commercial airship service.—
January 8 by Mr. O'Connell.

H. R. 3290—To amend the Air Commerce Act to provide for the safety of passengers in aircraft.—
January 19 by Mr. Powers.

H. Res. 94—Resolved, That rule X of the House is amended by inserting after clause 40a thereof the following clause: "40b. On Air Commerce and Civil Aviation, to consist of twenty-one members."
Resolved, That rule XI of the House is amended by inserting after clause 40a thereof the following new clause: "40b To air commerce and civil aviation — to the Committee on Air Commerce and Civil Aviation."—
January 29 by Mr. Costello.

S. 2—To amend the Interstate Commerce Act, as amended, by providing for the regulation of the transportation of passengers and property by aircraft in interstate commerce, and for other purposes.—
January 6 by Mr. McCarran.

S. 738—To amend the Interstate Commerce Act, as amended, by providing for the regulation of the transportation of passengers and property by aircraft in interstate commerce, to provide for safety measures therein, and for other purposes.—
January 14 by Mr. McCarran.

S. 970—To amend the Air Commerce Act to provide for the safety of passengers in aircraft.—
January 19 by Mrs. Caraway.

S. Res. 13—Resolved, That rule XXV of the Standing Rules of the Senate be, and the same is hereby, amended by inserting on page 30, after the third line of paragraph 1,

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New Weather Bureau Stations

Recently the United States weather bureau opened 100 new weather reporting stations at points off the lines of the nation's airways. It is believed that these stations will fill gaps in the bureau's weather network to further protect all air liners against weather hazards. At these stations, observations will be made every six hours. All weather forecasting instruments, both in the 100 new stations and the 50 old stations, are being brought up to uniform standards.

AIR MAIL RATE *Justified*

Recently the Interstate Commerce Commission reported to Congress that the existing 33 1/3 cent rate per airplane mile for air mail loads of 300 pounds or less is justified at present on eight lines examined.

Meteorology and Flight Control

BY H. L. KIRBY
Consulting Aircraft Dispatcher

H. L. Kirby, trained as a Chemical Engineer at the University of Minnesota, was an officer in the Naval Air Force during the War; after the armistice he flew the Navy mail route between Norfolk, Virginia and Washington, D. C., in 1918, one of the first established air routes. Mr. Kirby has been interested in route operations and aircraft weather for 19 years. He has had extensive flying experience in both land and seaplanes. He conducted the first research work in both aircraft weather and flight control, and is the author of the first text book on aircraft weather, published in 1930. He was an Associate Professor of Meteorology at the University of California. He is the author of numerous operating and meteorological regulations and has served as a consultant to various aviation interests for a period of 15 years. He has been directly associated with several of the major air transport companies as a technical advisor.

Within the past year or two the attention of the air transport industry, as well as of the public, has been directed to the so-called "Norwegian" or "Bergen" methods of weather map construction and weather forecasting. The terms "air mass analysis," "frontal analysis" and "air mass classification" are being widely and indiscriminately used.

Many weather maps have taken on the appearance of a futuristic art exhibit; pilots, in order to obtain practical records of weather conditions, must compute temperature in terms of "Centigrade" as well as "Fahrenheit" measures, must compute altitude in terms of "meters" as well as "feet," must understand pressure in terms of "millimeters" or "millibars" as well as in "inches" of mercury; any question directed to the modern meteorologist may bring forth a confusing array of "cold fronts" and "warm fronts," "surfaces of discontinuity," "conditional instabilities," "potential temperatures," "transitional tropical" or "continental polar cold" air masses, "tephigrams" and "Refsdal Charts."

Is This a New Type of Weather Map Interpretation?

The Air Line Pilots' Association, through its President, Mr. Behncke, now has asked a question which is both direct and opportune; that question is: "Are the students of the so-called Bergen meteorological methods sponsoring some new and distinct type of weather map interpretation, and weather forecasting routine, the fundamental principles of which

(Continued on Page 5, Col. 1)

NEW CLUB SHIP ON UNITED

With Captain H. L. Knoop and First Officer Ray Andrews in the cockpit, United Air Lines' new club lounge airliner, latest development in commercial flying, completed its first non-stop flight from Chicago to New York. The 715 miles were covered in 3 hours and 45 minutes at an average speed of 196 miles an hour. There was no effort to set a record, rather it was a demonstration of smooth, accurate transport flying.

The new Douglas DG-3 weighs 24,000 pounds fully loaded and is designed to supply the maximum in comfort and reliability for first class passenger service.

BIRD-PROOF WINDSHIELD

The Bureau of Standards is attempting to devise a windshield for transport planes which will be bird proof. To those pilots who have found themselves all unwittingly peering through the innards of a duck while its dripping feathers formed a jaunty headdress, such news should bring a certain amount of relief.

Dr. G. M. Kline of the Bureau is seeking a transparent plastic of some sort which has the strength to withstand some 10,000 foot pounds. His way of testing windshields thus far constructed is to fire rubber balls at them from an air gun.

ARMY TESTS *Tricycle* LANDING GEAR

The Army Air Corps recently started on a tour to various army fields, demonstrating a tricycle landing gear which is said to remove the hazard from blind landings.

The gear, adopted from the nose wheel system used on Wright Brothers planes twenty-five years ago, was to be tested by various units to determine the extent of its future application to military aircraft.

The nose wheel system is a reversal of the normal procedure in landing, according to engineers, and with the side wheels moved back of the center of gravity, planes incline to pitch forward onto the nose wheel instead of rearing backward onto a tail support.

The gear eliminates the necessity for "leveling off" before making landings and the weight of the plane is transferred from the wings to the landing gear as soon as the earth is contacted.

William M. Leiserson of Ohio was reappointed by President Roosevelt recently as a member of the National Mediation Board.

"Keep I. C. C. Clear of Politics" Says Joseph Eastman

Address of Joseph B. Eastman, Member Interstate Commerce Commission, Before the Boston Chamber of Commerce, January 21, 1937

A week ago today you had the opportunity, which I am sure you welcomed, to hear from three friends of mine who told you in turn about the railroads, the highway carriers, and air transport. I have read what they had to say with pleasure and profit. You are, I understand, to have a third meeting with a speaker who will tell you about water transportation, and that is very appropriate and fitting, for New England was raised on ships and would never have been what she is today without them. If at any time you become a little fed up with the difficulties of life and business in this corner of the country, I suggest that you read a very remarkable book called the "Maritime History of Massachusetts". It ought to be a textbook in your schools, because it shows the extraordinary way in which your ancestors took advantage, against the competition of the whole world, of opportunities which consisted only of good timber for the building of ships, good harbors from which to sail them, and keen, hardy, and daring men with which to man them.

If I may offer a further suggestion, I hope that you will ask some one to tell you about what once was, and still is in part, the electric railway industry. That industry has probably had a harder time in recent years than any other branch of transportation, with the exception of the horse and buggy, but it has met its troubles with an unusual amount of courage and ingenuity and has a most interesting story to tell. No one can tell it better than Dr. Thomas Conway, Jr., the present president of the American Transit Association, but if you cannot get him, a substitute just as good would be your own Edward Dana, president last year of that Association and the operating head of the Boston Elevated Railway.

Employees Should Be Heard

It would be a good idea, also, to hear some representative leaders of transportation labor. The employees have at least as great a stake in the industry as those who put their money in it. Their welfare ought not to be neglected, and you may be sure they will not permit it to be overlooked. You ought to get their point of view, just as they ought to get yours. Many of our troubles grow out of prejudice, or lack of understanding, and closed minds.

You have asked me to talk, I presume, because I am a part of a branch of the Federal government which deals with transportation matters, namely, the Interstate Commerce Commission. The Supreme Court has said that the powers of that body are "expected to be exercised in the coldest neutrality". That was said of controversies between railroads and their patrons, but it has just as much application to conflicts in interest between different forms of transportation. The Commission is not a partisan of any one of them. It is its duty, so far as it has jurisdiction, to be equally fair to every kind of carrier, and to keep in mind always that it was created to protect the general public's welfare. In what I shall have to say to you I shall try to be animated by that spirit of neutrality. The difficulty comes in keeping it within the degree of frigidity which the Supreme Court expects. It is hard to be cold about the transportation situation of today, because it is full of vitality and fascination and in a period of rapid growth and change which excites the keenest interest.

New Forms of Transportation

Last week three men addressed you. Not so very long ago, if you had had a similar meeting, it would have been addressed by a single man, because there was no commercial highway or air transportation to talk about. In a short space of time, as the world goes, these forms of transportation have been born and have gone through infancy to early youth, so that they can now be represented on the same platform with old man railroads. And the result has been that the old man is being rejuvenated. He is wearing new clothes, stepping out, and beginning to court the coy shippers and passengers again.

Without being at all critical, be-

(Continued on Page 6, Col. 1)

Extensive Reequipment Program Planned

After the best 12 months of business in the history of commercial flying, the industry's leaders are sufficiently optimistic to predict a million and a quarter paying passengers, new records in transporting mail and express, and new marks in safety, comfort, and regularity of service for 1937.

In line with their optimism, major air line operators are planning extensive reequipment programs. Approximately $12,000,000 in orders for new airplanes has already been placed with the aircraft manufacturers. Larger and faster machines with longer cruising ranges will be used which should be considerably safer than those now flying the airways.

In March 1936, five of the larger operators, United, American, T. W. A., Eastern, and Pan American Airways, joined forces to finance production of an experimental 40 passenger, four engined airliner. Should this ship meet all tests and requirements, it will be ordered in large numbers by the various air lines.

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"Public safety calls for pilots of high character and great skill. The occupation is a hazardous one. Therefore, the law should provide for a method to fix maximum flying hours; minimum pay and a system for retirement or annuity benefits."
—President Roosevelt.

TRIAL AND ERROR

BY DAVID L. BEHNCKE

Henry Ward Beecher once said, "Private opinion is weak but PUBLIC opinion is almost omnipotent."

The numerousness of recent terrible air crashes has finally centered public opinion upon the regulation and conduct of air transportation. This fact is the one ray of hope that something will be done.

Aroused public opinion is a powerful weapon on the side of those who have long been struggling, earnestly and unselfishly, to increase air line safety. Mr. John Public has become interested in air safety and is asking for his "day in court." He can no longer be lightly pushed aside. He has some very pointed questions to ask; one of them is:

We have had many hearings and much investigation as to the causes of air crashes and the truth is in the record; why has proper action not been taken?

This question is becoming increasingly hard to answer.

The line pilots are aware of what is causing the present-day crashes. Their opinions and recommendations are a matter of public record and available to those who have the power to act. The problem of increasing safety on the air lines is not a difficult one. The pilots feel that the enactment of a real safety law, drawn along the same general lines as the railway safety laws, is the solution.

Since the last series of accidents there have been many opinions advanced, emanating from various sources. Numerous individuals have commented in the public press, giving their ideas as to the cause of air accidents. Most of these opinions are purely guesses and are based on some individualistic, pet theory.

There is no doubt that air accidents are due, not to one single cause, but to a number of causes all of which are closely related and can, with the proper effort, be defined, then controlled or eliminated.

Pressure to complete schedules is not conducive to safety.

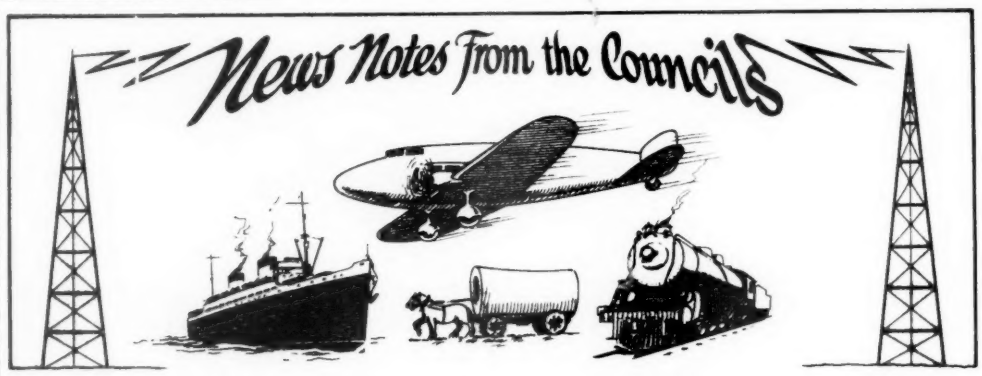
In some instances investigation and evidence tends to disclose that pilots have not only been pushed but have been practically ordered to fly under adverse flying conditions. All this must be eliminated before any real headway can be made in the direction of greater air safety. Evidence in all cases is hard to obtain. The reason for this is very obvious. A pilot cannot be blamed for not wanting to report against his company.

It is only natural that the air carriers should strive to complete a high percentage of schedules. However, sight cannot be lost of the fact that the safety of the air traveling public must be carefully guarded and when the weather conditions are so bad that it is unsafe to fly, the red flag of warning should go up and flying under these conditions should cease immediately.

It is surprising to note that, in the face of the many terrible accidents which have been occurring, there are still some who will say that air transportation is a young industry and should be allowed to proceed on the basis of TRIAL AND ERROR.

The Air Line Pilots Association has always differed sharply with this contention because in air transportation,

(Continued on Page 8, Col. 1)



NORTHROP HERALDS PILOT PROGENY

VELLY VELLY BAD! STATION MANAGER

BY PILOT TOM HATTEN
Council No. 35—A. A.
Memphis, Tenn.

With all the holidays behind us and bad weather settling in, there really isn't much to write about unless it would be the weather.

Carpenter, McFail and Ledbetter were on the other end of the line and I understand they were commuting between Newark and Chicago which probably made Duke very unhappy.

McFail's house has begun to take shape since he was away and couldn't bother the carpenters.

B. A. Carpenter was in Nashville for a few days and came home with a big smile. So, all in all, everyone is very happy except Pricer—all this time off, his dog sick and the quails under cover.

Heard a Chinese and our station manager in Newark having an argument about a bag that was missing and it sounded like this:

"Mighty damned seldom you handle my bag.

My bag she no fly.

You no fit to be station manager; that's all I hope."

There were a few more lines but I don't think they would pass the censors.

Johannpeter is on vacation and by the time he returns guess the thirty-seven vacations will be in effect and then maybe there will be something to write about.

We have been moved from the Essex House in Newark to the Douglass and since they don't have a gym, the DeVoy gym here in Memphis has been getting quite a few members.

I give up; there just hasn't been anything going on around here to write about so this is the end.

JOE CHASE AND BRIDE NOW IN BRAZIL

BY PILOT W. PAUL YOUNGS
Council No. 37—P. A. A.
Rio de Janeiro

We welcome with open arms to our little family of Brazilians Captain Joe Chase, he of the streamlined ears and teeth, and his charming new bride who will make a much needed addition to our sewing circle. Joe was laid up in the States for several months with fifteen different kinds of tropical fever which he picked up flying the West Indies run, but it certainly didn't hurt his eyesight judging by Mrs. Chase, so again we say welcome.

We are at this moment enjoying a week's layover in Para, the golden city of the Amazon, where it has been raining every day. We were able to greet the Chases on their arrival with horrible tales of life in the real tropics. In a few more days we will take them on a three day trip in a good old Commodore to Rio with Joe as the co-pilot and will he work, oh boy! The only sad part of it all is that when Joe is checked out we will be transferred to Miami and as the time gets shorter Rio de Janeiro looks better and better. But we guess three and a half years is long enough and the States is a swell place.

Bancroft Goes Native

The Great Bancroft arrived back from vacation with tremendous tales about sail fish twenty feet long and awful battles with unknown denizens of the deep. Somewhere along the line he had picked up a Siamese cat, blue eyes and everything. We were all a bit disappointed he didn't bring down a wife but he said the cat was cheaper, didn't take up as much room and couldn't talk back to him. Well, we guess it's all in the way you look at things.

Brownell and Wildman are still on vacation in the States which leaves us not too many "pilots" for our schedules.

New Run

Captains Kraigher and Maxwell brought down an Electra from Mexico the end of December for our Bello Horizonte run. Maxwell remained to check out our No. 1 Brazilian pilot, Luiz Tenan. Rio to Bello Horizonte is about 200 land miles but the run from the coast up through the mountains to the rich interior city takes 17 hours by train (and what a train) so it is easily seen what a boon our new line will be to travellers.

We are patiently waiting for our new Sikorsky S-43's to replace the old Commodores but apparently the Army and Navy are taking all available motors or something. Anyhow, we've all developed a lot of patience down here or else the heat gets you, or maybe that's what's wrong with us now, and besides it's too late for more.

COLE HAS IT "ON THE RECORD"

BY CECIL P. NORTHROP
Council No. 32—P. C. A.
Cleveland, Ohio

A great deal has been said about the physical condition of Air Line Pilots, although about the only time you wish you were a really good pilot is when you can't see any farther than the instrument board. There is however a limit beyond which we should not go. It is suggested that Ali Ben Estes be carefully examined by a competent medico. We do not believe that expectant fathers should be exposed to the hazards of air line flying.

J. Hamilton Neale is another who is carrying himself very well these days. What with the new loose fitting overcoats, no one would suspect a thing.

Reverend Fights Fire

The Rt. Rev. A. E. Wilson is to be congratulated on his rare presence of mind in a recent fire which nearly burned to the ground his palatial home on the banks of the Potomac. Rev. Wilson (the one our wives say has such lovely big blue eyes) demonstrated recently that calm, cool judgment only to be found in those who daily battle the elements, by dealing with a slight conflagration, shall we say, which only burned out his sun room and part of the dining room instead of the entire neighborhood. From the newspaper account it seems the Rev. Wilson was dozing on the lounge in the sun room when he noticed his head becoming hot, and experienced difficulty in breathing. Rousing himself he noticed smoke curling from the pillow. He realized a fire must be in the vicinity. However, not to arouse the other guests in the house he calmly reversed himself, and put his feet where his head had been and relaxed once more in the arms of Morpheus. The flames then began to crackle, and thick black smoke brought both ceiling and visibility down below the limits. Then, and only then, did he decide the time had come to inform his guests, that as much as he regretted it, he had to disturb their slumbers because the house was on fire. The Reverend then betook himself to a hotel over in Washington, but kept in constant touch by phone with the situation. Very much in the manner of "Airways".

Speaking of "Airways" (and who doesn't) we come to our own Bud Baker. The "winnar," ladies and gentlemen. The only man in captivity who has been able to get "Airways" to admit they were wrong. He wins the rubber putty knife to be used in scraping ice off the windows, along with the self-blowing radio fuses. He wins, gentlemen, but—Sic gloria mundi—

(Continued on Page 3, Col. 1)

"To fly West, my friend, is a flight we all must take for a final check."

In Constant Memoriam

Active

Accidental

Anderson, Lloyd—U. A. L.
Andert, Paul A.—U. A. L.
Barron, John M. Jr.—A. A.
Bigelow, Ed.—U. A. L.
Blom, Edwin W.—U. A. L.
Bolton, Harvey F.—T. W. A.
Bontrager, C. M.—R. A. L.
Borchers, Adrian—P. A. A.
Bowen, J. E.—T. W. A.
Bowen, Lewis L.—B. A.
Briggs, Francis W.—A. A.
Broughton, D. E.—U. A. L.
Bucher, Charles L.—P. A. A.
Cohn, Hanley G.—W. A. S.
Cox, Floyd—Ludington
Davis, Alfred W.—U. A. L.
Davis, Douglas—E. A. L.
Dixon, Andrew Jr.—D. A. L.
Fields, Glenn T.—A. A.
Fuller, Ray E.—A. A.
George, Hal—T. W. A.
Grover, R. Boyd—U. A. L.
Haid, Arthur A.—N. W.
Haligren, W. A.—A. A.
Hill, George W.—A. A.
Holbrook, Clyde M.—A. A.
Jamieson, W. L.—E. A. L.
Kelsey, Harold J.—A. A.
Kincanon, Ted N.—A. A.
Komdat, Albert C.—E. A. L.
Lewis, Harry C.—T. W. A.
Livermore, Joe—N. W.
Lucas, Al—W. A. S.
Lucas, Verne—Ludington
Lynn, John B.—C. & S. A. L.
McMickle, Harold—P. A. A.
Malick, Forrest E.—U. A. L.
Marshall, Gerald V.—A. A.
Montee, Ralph—T. W. A.
Montijo, John G.—V. A. T.
Morgan, Howard R.—T. W. A.
Mossman, Russell C.—C.&S.A.L.
Neff, Harold—U. A. L.
Noe, Earl J.—T. W. A.
Odell, M. T.—A. A.
Owens, Clifford P.—W. A. E.
Paschal, A.—P. A. A.
Potter, Norman W.—U. A. L.
Radoll, R. W.—U. A. L.
Riggs, Russell S.—A. A.
Robbins, Wm. J. B.—A. A.
Rousch, Chas. W.—N. W.
Rust, F. H.—A. A.
Sandblom, J. V.—C. P.
Sharpnack, J. W.—U. A. L.
Sherwood, George C.—W. A. E.
Tarrant, Harold R.—U. A. L.
Underwood, Sanford L.—A. A.
Vance, Claire K.—U. A. L.
Waldron, Joe—A. A.
Weatherdon, Edwin—A. A.
Wieselmayer, Otto—P. A. A.
Worthen, John A.—W. W.
Zeier, Carl F.—C. & S. A. L.

Natural

Cochrane, Robert M.—U. A. L.
Fife, John A.—C. A.
Hohag, R. J.—N. W.
McConaughey, Ira M.—A. A.
Phelps, Henry T.—P. A. A.
Swanson, Axel—A. A.

Inactive

Burford, Dean W.
Drayton, Chas. M.
Noyes, Dewey L.
Ormsbee, F.
Shelton, Boyd M.
Stark, Howard C.
Wheaton, Harold H.

Waiting List

Brock, Wm. S.
Kiser, Daniel

Unemployed

Hays, George L.
Keadle, Floyd E.

Honorary

Rogers, Will

SHERIDAN CONSULTS HIS "POOLA"

(Continued from Page 2)

with a gleam in its eye, Airways awaits for a nice juicy overcast with heavy ice into which they will cast our hero, from a CAVU top, to contact. The instruction will read, when viewed by the Crash Board, "Do as we say and argue about it afterwards."

Off the Record

While we are on the subject of "Airways" this council would appreciate it very much if the strangers coming into Detroit for any reason would please pass over Wayne County Airport so that the DT airways control can hear them. It has been claimed by airways at that station, that they are never wrong; they cannot hear us go over the field. After all, that is a very lonely place out there, and after sitting in the tower all day long they are entitled to some fun. Especially when they tell their best gals: "Watch me bring that mighty monarch of the air right plumb dab over the airport." Then they have to wait and wait and nothing happens. So if it isn't too much trouble, some of you American boys who are cleared to Chicago with Mexico City and Sewell, Alaska, as alternates might go over Wayne County just to keep peace in the family. We always go over and circle the port a couple of times, if it isn't too late. This gives them a chance to talk over the interphone and then listen to their voice back over the Ediphone, when times are dull. This is a favorite pastime in all the Towers, and in Cleveland especially. Old man Cole, head-man in the "Airways Confusion" office, never sees you but what he invites you up to listen "to the record". This is a lot of fun if you just enter into the spirit of the thing and always remember you are wrong before you start. Personally we argue at home with the "little woman" just for the pleasure of knowing she can't spring a "record" on us.

The 247's sure fly nicely on one engine but Pilot McClaflin of the Milk Run (DT to MK) put one down the other night in Vermillion. Mac says he was doing OK until the instruments started dropping off the board due to vibration, and the right navigation light looked like a shooting star. Eddie O'Donnell the "Virgin of the Western Division" was with him. We hate to think it but Eddie is getting to be considered, as we say at sea, in the light of a "Jonah". If anything is going to happen Eddie is usually there. Two nights later Eddie riding as dead-head came into DT with a nice little Stinson "A" just about ready to fall apart or somethin'. Anyway Eddie and Mac both got letters from the "Beatle" telling them how brave they were, and now neither will talk to us poor common mugs so we don't know many details. All we can say is "we are glad it was you brother; we are glad it was you." Also a nice bunch of posies for neat flying to both.

Weiblen in the "Rackets"

Our old friend Chuck Weiblen, also on the Milk Run, has not been heard from for a long time, so we sent our spies up to the wicked city to get the dirt. They got it OK. According to their report, and they are never to be doubted, Chuck is now taking the place of the famous "Purple Gang" of DT. He now owns five thousand slot machines, 2,678 "push pull" ball layouts, and large interests in Hamtramac (never could spell that place, so never did find it). Old Rhino denies everything—but he always has—probably why he lived so long.

Second Pilot Casey Pierman has also been under the observation of our spies. For the sake of his family of six children we won't disclose what was reported; but it seems to us he is spending too much time in the ice rink, and very much too much time in a certain Lunch Wagon, where a gal with alleged "piano legs" shows special favor to customers with great big long long legs.

Check Pilot Popular

If you want to make the boys foam at the mouth just about now, meet them at the ship some nice dark night and say, "I am the check pilot and I am very pleased to meet you." You might lead up to the subject by having someone ask for their pass number. In case you don't know, check pilots get the money for the trip—need more be said? Ask Ed Couples for details.

We are getting nice new five year old "D's". As soon as we get some radios, and as soon as we get a maintenance base, and as soon as all the pilots get checked out, and if there are any passengers, we are going to do some swell flying, that is if the Department of Commerce will let us do instrument flying again.

Scram, here comes the check pilot.

CARTER ADVOCATES 'DEAD' RECKONING

BY PILOT H. W. SHERIDAN
Council No. 39—A. A.
Chicago, Ill.

Well, here it is, the twenty-fifth again, and that is the dead-line for this literary banquet. By literary banquet I refer, of course, to the magazine itself, not to my news letter. You know, a banquet goes from soup to nuts. This news letter is the nuts.

So the dead-line stares me in the face and says, "Write! Write!" None of my three adjectives are adequate to describe the feeling, but I can use an illustration. It must feel like the homely but hopeful bride whose new and sobering husband rolled over, looked at her and said, "For the love of Pete, Anna, sing." And no one gave me any news that we can print. Dog-gone, a news letter without any news is like a honeymoon without any honey. Or a honey without any moon; I get kinda mixed up when I'm in a hurry this way.

But some news did come in, under its own power. Eastern Air Lines has just put on Gigolaires. Gigolaires are, in a word, male stewardesses. Don't look now.

And Larry Harris, the Ringling Brothers of the air, is going to buy an airplane in order to teach his boys to fly. Well, well, how time she do get along. It seems only yesterday that they were only knee high to an eagle.

Mass Production

Well, while I have been sitting around here doing practically nothing, a couple of our lads up and have babies. Jack Swain just had a big boy, no trouble at all. Mrs. Swain helped him some. They are taking from the West Suburban Hospital in Oak Park, one of the better factories. Jack says the little tike is a swell model except that the tanks are too small in that he has to make a landing to refuel every couple of hours.

Harold Skelly had one, too, and I didn't even know that he was in a delicate condition. I've been trying to find Harold in order to get the specifications, but I haven't had any luck.

Gerding Burglarized

Now, don't go thinking that there is any connection implied, but Stan Gerding was burglarized. Stan is a little huffed about it. He thinks it was darned unneighborly of the burglar to be so stealthy about it. Stan says that any time he will be glad to get up and help 'em look. Europe may have their . . . (this is censored so it must be good) . . . but we have our Duke of Hard Luck in the person of Senor Gerding—he changes from first pilot to second pilot and back again so frequently that he bawls himself out and ends up by calling himself sir. Stanley is adopting a family crest, the principal part of which consists of a parrot that lays square eggs and never learned to talk much because as far as she was able to get was "ouch!"

"Poola" Tells All

You haven't seen my Poola but I got one. Popeye can have his jeep. I won't tell you what the Poola is nor how I got it, but believe me I can look into my Poola and perceive the shape of events to come. As an example of its power let me say that I gazed into my Poola and could see that next fall there are going to be some family increases of considerable proportions in our ranks. Of course, I looked at the weather charts, too.

And I also saw that this year stewardesses are going to be a little plumper. Stewardess Wanda Fishtail said that any nut could know that, since the second pilots just got a raise in pay. There you are, stewardesses don't understand metaphsics—just physics.

And Poola revealed that official boards bristling with Coronas are going to investigate the four deplorable crashes we had in the West, and they will find that three of them were caused by pilot errors. The fourth pilot lived. (This paragraph is censored also, but I did it myself. I took a cold shower.)

Homing Devices

Which brings up the homing devices. American Airlines has experimented for two years with all available radio compasses, and issued an order to Bendix for a large number, but the army beat us to it and we can't get any for a year, or so my best information has it. Shielded loop antennas have been ordered, our president told me, and will be installed without delay. In the meantime we are experimenting with a Simons radio compass, the one described in the last issue of Aero Digest. It has two loops set at an angle one to the other, and measures the differential between them; thus its reading gives the bearing on or off the radio station directly in degrees without the necessity of rotating a dial. It looks good and I hope to test it in flight in the next day or so. If they ever find me I'll let you know how it works.

Personally, I think that they are missing a good bet in these homing devices, and so does Roy Mitchell. There is no homing device like a soft and dimpled blond. Four years ago, Roy Mitchell, then Chief Pilot of the Southern Division, was asked by a visiting official if he had investigated the gal friends that the boys might have, and Roy replied that he had not except to note that whatever it was it got the boys through some pretty tough weather.

Roy Mitchell has just been appointed Assistant Operations Manager for the Southern Transcontinental Route. That is swellegant. E. L. Sloniger goes down there as Chief Pilot. Walter Braznell is demoted from first pilot to Chief Pilot of the eastern lines. They made a mistake in Walter, though. There is nothing wrong with that guy.

This is supposed to be a news letter. All right, I had a passenger on my ship yesterday.

There is a rumor that a Northwestern professor is slated to take the place of Mr. Vidal when and if that gentleman leaves his present office. You ought to have a Poola.

Boak Carter Recommends

The other night, just following the western investigations into how far an air liner could push a mountain, Mr. Boak Carter in his radio talk recommended that pilots navigate by dead reckoning. Within a day he had received two dozen telegrams advising him that that was just the trouble with that kind of reckoning.

Boards are investigating the crashes. How about calling in each air line pilot and have him write a report of the last three close calls that he had, a complete report including all causes bearing upon the emergencies? The boards ought to investigate the crashes before they happen — the coroner will do it afterward.

Now here is a very illuminating exercise for all members of the ALPA. Draw up a chart, ruling it down the middle. On the left hand side put the official findings of the cause of the last three years' crashes when the pilot was killed, and the right those when the pilot lived. You will notice something funny about it—if you have a very keen sense of humor.

We've got to stop this cracking up. Already people are getting into the habit of saying, "He is a good pilot, wasn't he?"

It is up to the pilots now to orientate. If need be we should have the courage to protect the government against itself, even the air line management against itself. A thousand to one chance here, a thousand to one chance there—no officer nor dispatcher has ever succeeded in suspending the Law of Averages. Wasn't it Abe Lincoln who said that the bravest man he ever knew was a fellow who could say "No."

"More Than a Job"

The day that the Air Line Pilots Association became a success was the day that pilots began to defend each other. No matter what ever may come, that fact is an historical monument to Dave Behncke and his faith in us. We have learned to respect and admire our fellow pilot, and it has made each of us respected and admired by our people, those who trust their lives and loved ones to our ability and judgment. For once I am not joking. To the children or the parents of a passenger, his life means the whole world. We should not forget that it means more to us than our jobs.

Bert Acosta just came back from Spain. He said that he went over when it looked like they were going to have a nice chummy little war, but he got disgusted and left when, like a bunch of amateurs, they showed signs of getting mad at each other. But the Spanish fuss has revealed that the Russians have the world's fastest pursuit planes. Charlie Hack says that is what he wants in the next war, something he can really retreat in. They say that the Spanish theater is just a rehearsal for the big powers. So it is not surprising to find that Vultee is supplying their flashing attack planes to Japan in large numbers.

Stewardess Sarah Bell Um is pretty well down these days. So many of her pals have gotten married. But she claims she knew it was coming because most of them had practically been brought up in a family way. What she actually said was, "Most of my girl friends have gotten married and had babies. The others are just backward."

United has lately received some of the big Douglas planes. If you hear their pilots chuckling and giggling into the microphone you will know that they have just looked at the gas-gauges.

Sarah, who is an awful liar, says that she asked Usher Roush why some people don't eat pork and he said he guessed they weren't cannibals.

George Hersam reports that he has found out what the term CAVU means as lately used by the weather reporting services. It means, according to him, ceiling and visibility unknown.

AIR COMMERCE BUREAU
Written On
SPECIAL WEATHER REPORTS

Headquarters has recently received complaints from pilots concerning the difficulties they experienced in securing special weather reports. In this respect the Bureau of Air Commerce was written as per the following letter:

December 29, 1936.

Major R. W. Schroeder
Chief, Air Line Inspection Service
Department of Commerce
Washington, D. C.
Dear Major:

I have received a number of complaints recently from pilots stating that they have considerable difficulty securing special weather reports.

In some instances, I am informed, they are able to get such reports over the radio sets upon requesting them while enroute, but they are not actually put on the tape, which I think is quite important. I recall that when I was flying the line a few years ago, special weather reports were sent over the tape whenever sudden changes occurred, especially if such changes constituted increasing bad weather.

I believe that the Bureau should take a liberal attitude on this matter, and send special weather reports to the pilots via the teletype circuits, whenever it is possible to do so.

Please refer this to the proper department and see what can be done about furnishing information regarding special weather in emergencies. Your prompt consideration in this matter will be greatly appreciated.

Sincerely yours,
AIR LINES PILOTS ASSN.
/s/ DAVID L. BEHNCKE, Pres.

* * *

(Reply from Bureau of Air Commerce)

January 4, 1937.

Mr. David L. Behncke,
President, Air Line Pilots Association,
3145 West 63rd Street,
Chicago, Illinois.
Dear Mr. Behncke:

I have your letter of December 29, 1936, addressed to Major Schroeder, concerning special weather reports.

Under separate cover the following publications are being sent you:

One Circular N of the U. S. Weather Bureau.

One Instruction Bulletin D-5, Bureau of Air Commerce.

These publications will explain the provisions made for the taking and broadcasting of special weather observations.

I shall appreciate your forwarding me each case of complaint that you have or that you may receive, in order that a check may be made. In many instances it appears that the pilots obtain weather reports over their company radio circuits and the handling would be different from that occurring on our communication system, but all this would be disclosed after the investigation of each complaint that you would send to me. I shall, of course, advise you of the results and action taken to correct any inadequate service.

Thanks very much for bringing this matter to our attention.

Sincerely yours,
/s/ REX MARTIN,
Assist. Director of Air Commerce
(Air Navigation)

Submit Complaints

In accordance with the above letter, all complaints should be sent either to Headquarters or direct to Rex Martin, Assistant Director of Air Commerce, Department of Commerce, Washington, D. C. The publications mentioned can be obtained either from ALPA Headquarters or the Department of Commerce.

British Airship Ready For Oceanic Hop

The Caledonia, British Imperial Airways' flyingboat which will make transAtlantic test flights, is now ready for the hop and will take off from the air base on the west coast of Ireland some time this month. From there it will head for Newfoundland and then New York.

BLOOD PRESSURE

We hear much about blood pressure. Individuals who are impressionable upon considering the possibility of a high blood pressure entertain ominous thoughts of strokes and paralysis, of heart disease and Bright's disease. There is an element of concern about the welfare of people who might have high blood pressure as evidenced by the attitude of life insurance companies who refuse to insure such risk. It may comfort those who are concerned about blood pressure to know that many people have had high blood pressure for many years without knowing they had it, and are still carrying on in comfort. Not every case of high blood pressure follows an uniformly gloomy course. While occasional cases run a rapid and fatal course, it is undoubtedly true that many cases are comparatively slow and run a very long course. In general, however, the manifestation of definite high blood pressure is sufficient cause of rejection of applicants for positions requiring perfect physical fitness.

Maintenance of Normal Blood Pressure

It is intended to present in this article, a brief and easily understood description of the principles underlying the maintenance of normal blood pressure. Such presentation is necessary before the reader can grasp the significance of high blood pressure.

In order that the nutrition of muscles and other living tissues may be accomplished and that they may receive a continual supply of oxygen from the lungs and be able to free themselves of their waste products, the blood which flows through the tissues must be circulating continuously, day and night, asleep or awake, from birth to death. The pump which forces the blood through the body is the heart. This pump can never stop for repair. The vast system of pipes through which this pump forces the blood consists of arteries, capillaries, and veins. These pipes must function perfectly throughout life, else disorders in the wellbeing of the individuals occur.

The whole system of blood vessels is distensible and elastic. It is estimated that the amount of blood contained in the body is about seven per cent of the body weight. This means that in a man of 150 pounds, the vessels would contain a total of about 10 pounds of blood, or about 10 pints of blood. That the system of blood vessels is elastic and capable of contraction, is indicated by numerous facts. For example, a healthy man can give a pint or more of blood for a transfusion, and yet have the same blood pressure after giving the blood. If his blood vessels were rigid tubes, either his blood pressure would drop, or his heart would have to pump faster — neither of these occurs. Hence, his system of blood vessels has compensated for the loss of blood volume by contracting the caliber of the vessels, thus diminishing the capacity of the vascular system.

Since the driving force which pumps the blood around the vascular circuit is the heart, it follows that the pressure which causes the flow of blood must diminish as we pass from the great arteries to the smaller arteries, and must diminish still more as blood passes into the vast network of capillaries and is driven thereafter into the veins.

Function of Arteries

The chief function of the large arteries is to serve as elastic conduits, whereas the smaller arteries leading to the capillaries, have, in addition, the function of regulating the amount of blood flowing through the capillary network of the organs which they supply.

Thus the blood supply of any organ can be regulated by change in the size of the passages which carry blood to that organ. If the intestines need an active and plentiful flow of blood, the arterioles carrying blood to the intestines will then dilate, thus allowing an enormously increased volume flow of blood in a given time to the intestinal region. At the same time the flow of blood to the muscles of the arms and legs and to the brain may be diminished. This explains why one does not have a feeling of well being if he exercises too strenuously immediately after a meal. It is also thus explained why some people feel drowsy after a heavy meal.

On the other hand, when extreme demands are made upon the brain and upon the muscles, as in fighting, long flights, or in other exhausting influences, the little blood vessels leading to the intestines contract. This all but cuts off the supply of blood to the intestines, and forces the blood into that part of the body where blood and oxygen, energy and efficiency are most urgently needed.

In addition, under such circumstances, blood which has been gathered or pooled in the spleen is mobilized into the active circulation because of the release of adrenalin into the circulating blood from the adrenal glands by contraction of the spleen. This activity tends to speed up the heart, and mobilizes sugar from the liver in order that the muscles may, so to speak, turn in more fuel from the emergency tank, in order to more efficiently dispose of an unusual situation, that which aviators refer to as a tight spot.

Work Done By the Heart

As it is possible to estimate the work of an engine in an airplane, it is also possible to estimate the work done by the human heart. In order to do this it is necessary to apply standards proven in physics that the work done (W) is equal to the force (F) multiplied by the distance through which that force acts. $W = F \times D$. The other part of the formula, given in this article, represents the attempt to calculate the additional work done by the heart in imparting velocity of 500 millimeters per second to the blood in the great blood vessel which comes off of the heart, known as the aorta. The formula seems to emphasize the fact that the heart is an engine which really performs an amazing amount of work in health. If one has high blood pressure, the heart is operating with a wide open throttle which will near its peak load and capacity.

At each beat of the heart about 60 cubic centimeters of blood are pumped out into the aorta. The pressure at the opening of the valve leading into the aorta may be 135 mm. of mercury. As more and more of this 60 c.c. of blood is pumped out, the pressure diminishes slightly. Finally when the heart has completed its pumping stroke, somewhat like the compression stroke in a gasoline engine, and begins to start another cycle, the pressure in the great blood vessel, which may by that time be 90 mm. of mercury, will exceed the pressure within the heart and thereafter the valve, somewhat like the exhaust valve in a motor, will snap shut, thus protecting the heart from a back-flow of blood, in a manner comparable to the protection of an exhaust valve against back-fire in an internal combustion engine. It is not difficult to understand, if it is compared with an airplane motor, what happens to the human engine which suffers the effects of leaky valves.

Work Accomplished By Each Beat

The work of the heart can be calculated. If we take 60 c.c. as the average output of each ventricle or cylinder, 100 mm. of mercury as the average (not the maximum) pressure during systole or compression stroke, measured in the aorta, and 500 mm. per second as the velocity imparted to the blood thrown into the aorta, we can calculate the work done by the human heart at each beat, by the formula:

$$W = QR \text{ plus } \frac{wV^2}{2g}$$

where W stands for work, w for the weight, and Q for the volume in c.c. of the blood expelled at each contraction, R is the average arterial resistance or pressure at the beginning of the aorta, the main fuel line, and 500 mm. per second as the velocity imparted to the blood thrown into the aorta. In this equation QR is the work done in overcoming the resistance, and $\frac{wV^2}{2g}$ is the energy expended in imparting the velocity to the blood.

$QR = 60 \times 0.1$ m. $\times 13.6 =$ 81.6 gram-meters, or roughly 80 gram-meters.

$\frac{wV^2}{2g} = \frac{60\ (0.5)^2}{2\ \ 9.8} = 0.7$ gram-meters.

It is thus evident that the latter factor is negligible, and that for all practical purposes we may regard the work of the heart as proportioned to the output multiplied by the average arterial blood pressure.

Taking the average pressure in the pulmonary artery at 20 mm. of mercury, the work of the right ventricle, another of four cylinders, at each beat would be about 16 gram-meters. Adding the work of the left ventricle, (the number one cylinder) which pumps blood through the systemic circulation, to the work done by the right ventricle, which pumps blood through the lungs, the total work done by the two ventricles per beat is about 100 gram-meters per beat, which is equivalent to about 10,000 kilogram-meters in twenty-four hours for a man at rest.

Enlarged Heart

At work, the figures are much higher. Now if the man has a blood pressure around 175 or 200 systolic or during compression strokes in his arteries, it is obvious that his heart works at a tremendous disadvantage; has to do far more work to keep the circulation going. The result is that in the long run such a heart will do exactly what any other muscle will do when made to work hard and steadily over long periods of time: it hypertrophies or enlarges. This explains why high blood pressure and enlargement of the heart are so often found together. It also makes it obvious that a man with high blood pressure and an enlarged heart cannot attempt to perform spurts of rapid, hard physical work. His circulation may be comfortably good if he lives quietly, but he has no extra reserve to be put into sudden demands upon the circulation. His heart has already enlarged to compensate for the extra burden of high blood pressure. His engines are running at full capacity even when he is merely cruising. He cannot race. If he tries, he becomes short of breath. If he stunts, he will likely make a forced landing into a hospital bed. He should avoid rough air.

Measuring Blood Pressure

Two hundred years ago, and again one hundred years ago, actual determinations of the arterial blood pressure of animals were made by the insertion of tubes into arteries to measure the height to which the blood column ascended. At the end of the past century the invention of suitable apparatus allowed measurement of the blood pressure in man. Finally, in 1891, Riva Rocci perfected the method of measurement by means of an air-cuff applied around the arm. This cuff is inflated. It is in communication with a mercury or aneroid manometer by means of a rubber tube. The physician usually auscults or listens with a stethoscope placed over the artery, just below the air-cuff. When the pressure of air within the cuff just exceeds that of the blood within the artery, the vessel is compressed, and the pulsations previously heard through the stethoscope cease. The physician reads the manometer at this point. This gives the systolic pressure, which is the maximum pressure attained with the pumping stroke of the heart. The diastolic pressure is the minimum pressure attained in the vessel, and it corresponds to the resting period of the heart between pumping strokes. The measurement of blood pressure with a good manometer by this auscultatory method is accepted as standard. Machines have been invented which record a graph of the pulse waves with a continuous line, from which the systolic and diastolic pressures can be deduced. These have given rise to the establishment of the so-called oscillometric method.

It is probable that the extreme normal limits for the systolic blood pressure in the adult at rest are between 95 and 145 millimeters of mercury, but a narrower range of 110 and 130 is more usual than figures above or below this range. Pressures slightly higher than 145 are apt to mean early or slight hypertension.

Average Blood Pressure

The average normal systolic pressure at the age of 20 years may be considered 115 mm. of mercury, at 30 years 120, at 40 years 125, at 50 years 130, and at 60 years 135.

The average normal blood pressure of adults of all ages has been found in life insurance examinations to be 127 systolic and 83.5 diastolic.

The diastolic pressure in the normal adult ranges between the limits of 60 and 90 mm. of mercury. The diastolic pressure is of great importance. If it is high it means a constant and excessive strain for the circulation. In general, it may be said confidently that if one patient has a blood pressure of 190 systolic and 90 diastolic, whereas another patient has a blood pressure of 190 systolic (the same systolic pressure as the first patient), but has a diastolic pressure of 115, the outlook for the man with the higher diastolic pressure is very much worse.

The pulse pressure is the difference between the systolic and the diastolic pressures. It varies normally from 30 to 60 millimeters of mercury. A common adult figure is 40 to 50 for the pulse pressure, with a systolic pressure of 120 to 125 and a diastolic pressure of 75 to 80.

These figures are largely those published by Dr. Paul D. White in his excellent and authoritative work on the heart.

Hypertension

Any increase of blood pressure above the upper normal limits is called hypertension. Temporary increases from exertion or excitement are normal or physiologic, and are not included as cases of true hypertension. At the height of vigorous exertion the systolic pressure may sometimes go as high as 180. Excitement alone has a less marked effect, but it always has to be taken into consideration; for example, in physical examinations for admission into special services, excitement may result in a temporary elevation of from 20 to 50 millimeters.

The disease causes of hypertension are several. Common readings in high blood pressure are 195 or 205 or 220 systolic, and 95, 100 or 120 diastolic. The chief cause of so-called essential hypertension seems to be linked up with the heredity of the individual. It appears probably that there is an hereditary imbalance of the endocrine or gland system. Research work on the endocrines, and research work on hypertension itself, have given several glimpses of light, but the precise mechanisms leading to or mediating essential hypertension are still under investigation. Other important causes are chronic nephritis, urinary tract obstruction, adrenal tumors in rare cases, increased intracranial pressure (as from brain tumor or hemorrhage), and, to a very slight extent, thyrotoxicosis or goitre. The list given includes the less common causes. The greater number of cases fall within the class known as essential hypertension. Sometimes the vessels of the kidneys are hardened, sometimes vessels nourishing the heart itself are hardened, thus leading to various clinical forms of the disease. In some cases a hardened and weakened artery in the brain springs a leak under the strain of the terrific pressure, and a cerebral hemorrhage ensues, producing the fulminant clinical tragedy known as an apoplectic stroke.

The foregoing account, while not intended as a detailed technical presentation, will serve perhaps to clarify somewhat the much discussed subject of blood pressure. It is seen that the old rule of a man's blood pressure being represented by his age plus 100 is not entirely accurate. It is pointed out that while long life is not always impossible even with hypertension, the strenuous life is practically ruled out. Men with hypertension should not expect to pass examinations requiring almost complete physical perfection.

HOGAN, LABOR LEADER, DIES

Edmond K. Hogan died on December 31, 1936. To all those familiar with the labor movement in the last few decades, the death of Ed Hogan means the death of a man who devoted his entire life unselfishly to the cause of transforming industrial injustice into practical justice. Not only the City of Chicago and the State of Illinois, but the nation as a whole, has suffered an irreparable loss.

Among his activities were:

He was a member of the American Newspaper Guild.

He was chairman of the Speakers' Bureau of the Chicago Federation of Labor. He was general-vice-president of the Railway Carmen of America and president of the Chicago Council of the union. He was Chicago correspondent for "Labor," the journal of the Railway Unions. During the late presidential campaign, he was a valuable and untiring speaker in behalf of the re-election of President Roosevelt.

Brother Hogan became ill suddenly Monday, December 28, 1936, from streptococcus poisoning, which brought on several heart attacks, in one of which he died Thursday morning, Dec. 31.

The deceased will be missed by his many friends and co-workers in the labor movement of Chicago and the entire country.

COPILOT OWENS *Killed* IN CALIFORNIA

On January 19, Copilot Clifford P. Owens died in a hospital at Glendale, Calif., as the result of injuries sustained when a Western Air Express liner wrecked on a mountain near Burbank airport, January 12.

Copilot Owens was born in Napoleon, Ohio, and formerly flew for Aerovias Centrales between Mexico City and El Paso, Texas.

He became a member of The Air Line Pilots Association on October 14, 1933, holding membership number 738.

ALPA extended sympathies to the widow and children.

Pilot William W. Lewis, who was in charge of the craft, suffered a fractured leg.

Meteorology and Flight Control

(Continued from Page 1)

are not recognized and not thoroughly understood by the U. S. Weather Bureau?"

The answer to Mr. Behncke's question is, definitely, "no". They are using a style of map making, type of terminology and type of symbols which have been sponsored by the Bergen Geophysical Institute, Bergen, Norway, and which have been amplified and augmented by students of the Bergen methods at the Massachusetts Institute of Technology (M. I. T.) and California Institute of Technology (Caltech); the methods of these institutions are based upon fundamental principles of atmospheric circulation and air mass interaction which have long been recognized by Humphreys, Meteorological Physicist of the U. S. Weather Bureau, and by other scientists in this country. There is no need to review here papers by Humphreys and by Bigelow written prior to 1920, or to refer to specific material in Humphreys' text, "Physics of the Air," in which the so-called "frontal" principles of air mass interaction were discussed and current developments thoroughly anticipated.

Research Appreciated

Such research as has been accomplished by the institutions above referred to is appreciated by all interested in meteorological work, but the fact that the institutions have developed a particular "style" of map construction, or that they use particular "codes" and "symbols," or that they use a particular "classification" of air mass, or that they work in "metric" more than in English measures has no special significance insofar as practical meteorological determinations are concerned. The meteorological program of these institutions distinctly constitutes a development in the "general" meteorological field, not a development of weather analysis for route flying operations; the program may be of aid to the practical weather analysis procedures used in air line operations, but there is no evidence that it will be of greater aid than the general weather forecasts and general type route forecasts now routinely issued by the Weather Bureau.

Humphreys Foremost Scientist

The U. S. Weather Bureau has had available at all times the aid and advice of foremost scientists; Humphreys is without question one of the world's finest meteorological physicists. He has recognized and credited the Bergen methods, and he has not only understood, but to a large extent developed, the fundamental principles upon which these methods were based. The Weather Bureau was not only interested in the work of the Bergen school but assigned personnel to study the particular style and research of that school. Willet and others reported these methods to the Bureau, and it cannot be assumed that the Bureau did not make a proper decision is not arbitrarily adopting a style of map construction and machinery of map interpretation which was particularly fitted to conditions in Norway or Europe. Norwegian methods necessitated use of far more weather reports per unit area than were or could be available in this country; Norwegian theories contemplated the use of a great mass of upper air data which was not available in this country and which is still not available. Willet has accomplished a praiseworthy work in his "Characteristic Properties of North American Air Masses," but we certainly do not as yet scientifically know these "characteristic properties" of the atmosphere. The elaborate classification of American air masses, and the arbitrary conclusions concerning the properties of American air masses, have not been supported by sufficient research.

It cannot be assumed that the U. S. Weather Bureau will not adopt any procedure of practical value which may be advanced by institutions emphasizing the methods of the Bergen school; the U. S. Weather Bureau has already developed observation and weather analysis machinery which, with consideration of the extensive areas covered, lack of funds and limited number of observing stations, is superior to any similar meteorological machinery in the world.

Need for Upper Air Data

Scientists of the Weather Bureau and others in this country interested in meteorological work have recognized the need of upper air data for analysis of air masses and have made consistent efforts to obtain such upper air information; the work has gone forward in proportion to funds made available to the Weather Bureau and to others for such purposes. Early in 1932, Marvin, Humphreys, Gregg and Calvert of the Weather Bureau and Kirby of the University of California met in Washington to discuss means of obtaining and standardizing meteorological observations from planes in flight over the various air transport systems; a report by Kirby to the Scripps Institution outlining a program of upper air observation and study for the Pacific Coast was approved by the University of California as early as 1931. On June 21, 1933, incident to a meeting of the American Meteorological Society at Chicago, a special conference was called attended personally by Dr. Bjerknes of the Bergen Geophysical Institute, Dr. Humphreys of the Weather Bureau, Dr. Rossby of M. I. T., Dr. Patterson and Dr. Thomson of the Canadian Meteorological Service, and Kirby to discuss value and use of meteorological data available from planes in flight over regular routes and to consider a means of coordinating such data with the regular meteorological services. Prior to this Chicago meeting, students of the Bergen methods in this country had contributed to publicity which credited the methods with a direct relation to aircraft route weather analysis. It was interesting to note that, at this meeting here referred to, in response to specific questioning, Dr. Bjerknes classified the methods and program of the Bergen Geophysical Institute as a development in general forecasting, and his expressed opinions did not in any way confirm the publicity then relating the Bergen, M. I. T. and Caltech "style" of air mass analysis to air transport route flying operations. It will be remembered that, in the latter part of 1932 and early part of 1933, as the result of experimental work at Caltech and the application of the Bergen methods to one of the air transport company operations by a member of the staff of Caltech, the methods became very much publicized in relation to flying.

From the standpoint of air transportation, it is unfortunate that these series of publicized occurrences, particularly during the years referred to, tended to define the research and efforts of the students of the Bergen methods to the public as "new" developments in meteorology and as having a special relation to air transport route flying operations; this publicity did not aid the program of the Aerological Division of the Weather Bureau nor did it tend to credit the forecasts and procedures of the Weather Bureau in the eyes of pilot and dispatch personnel.

Increased Interest

For the past ten years there has been an increasing interest in meteorological machinery on the part of airline operators. This interest is a natural one based upon operating needs. The interest was reflected in pressure upon the Weather Bureau to furnish meteorological data in a form desired by the various operating companies. In many aspects the position of the Weather Bureau has been a difficult one; there has been a difference of opinion among operators in regard to meteorological needs, maps and terminology. It was also unfortunate that the unwarranted publicity available to students of a presumed to be entirely new meteorological method placed the Weather Bureau in the position of having been "forced" along lines of endeavor which would have logically been followed regardless of the Bergen influence, lack of finance alone being the cause of delay.

Investigating Committee Appointed

On July 31, 1933, a Science Advisory Board, to act under the jurisdiction of the National Academy of Sciences and the National Research Council, was created by order of the President. A special committee to investigate and report on the work of the U. S. Weather Bureau was appointed; that committee was composed of Dr. Karl T. Compton, President of the Massachusetts Institute of Technology, Dr. Robert A. Millikan, Chairman of the Executive Council of the California Institute of Technology, Dr. Isaiah Bowman, Chairman of the National Research Council, and Charles D. Reed of the Weather Bureau Station of Des Moines, Iowa. Prior to the formation of this committee both M. I. T. and Caltech had established Meterological Departments under the supervision of students of the Bergen methods; students or associates of both institutions were in active contact with air transport companies; both institutions were training students in these methods. The experimental work of Dr. Krick, of Caltech, in association with Western Air Express had received extensive publicity. It is to be assumed that the publicity given meteorological methods emanating from M. I. T. and Caltech was not unknown to Dr. Compton and to Dr. Millikan. It is to be assumed that both Dr. Compton and Dr. Millikan had an interest in the development and work of the Meteorological Departments in their respective institutions. It is only natural that they should have such interest.

Committee Emphasized Bergen Methods

The report of the committee, rendered on November 13, 1933, most certainly emphasized the methods of the Bergen Geophysical Institute and most certainly suggested that the Weather Bureau study and adopt those methods. Though such was probably not the intention of the committee, the report focused the attention of the air transport industry upon the Bergen meteorological methods with the result that these methods were subsequently very much overemphasized in the industry.

In need of meterological aid it was but natural that some air transport operators, aware of the high calibered sponsorship and publicity which had been given, should entertain and accept, at least in part, the recommendations and procedures of one or more of the enthusiastic students of M. I. T. It is believed to be fortunate that the practical experience and practical viewpoint of pilot and operations personnel acted to some extent as a moderating factor in the application of the Bergen methods to the meterological and dispatch machinery of the air lines concerned.

It is not the purpose of this article to criticize either the institutions referred to or their programs, nor is any criticism of air line companies implied. Air lines have spent thousands of dollars in efforts to improve meteorological machinery. An attempt has been made to explain why a "style" of general weather interpretation, in the hands of a few technical meteorologists without practical aircraft weather experience, has been able to influence the meteorological policy of the air transport industry prior to proper test or approval by the U. S. Weather Bureau.

Effect on Pilots and Operations

The effect of these new procedures has not been equal on all operating companies; but what has been the general effect upon pilot personnel and upon operations?

Extensive weather experience of pilots has not been used to its full advantage. Insufficient use has been made of pilot observations of weather conditions. "Forecasting" of route weather has been stressed; development of practical procedures, for use by dispatch and pilot personnel in determination of the character and "trend" of weather, has been neglected. Meteorological instructions in some instances have been issued which could be, and possibly have been, contributory to error in dispatching. Pilot responsibility has increased and pilot authority has decreased. Centralized Flight Control has been overemphasized. Practical training of dispatch personnel has been neglected and, in the industry as a whole, dispatch personnel constitutes the weakest link in the flight control machinery. Extensive tootechnical training material, influenced by students of the Bergen methods, has been issued to both pilot and dispatch personnel; much of this material contains equations and formulas and advanced mathematics, having little or no practical relation to route flying, which only a physicist could evaluate; a physicist in going over the material would find it theoretical and contradictory.

Every experienced air line pilot understands and accepts the fact that continued technical training is necessary not only for present operations but for future operations, but the pilot has a right to insist that training be accomplished by practical methods, and that material be in practical terms.

AIR MECHANICS *Will Hold Convention*

According to The AIR LINE MECHANIC, official publication of The Air Line Mechanics Association, delegates will convene at Chicago Monday, April 5, 1937, for their first national convention.

Three of the most important questions that will arise are:

1. A standard wage scale for mechanics.
2. Revision of hours and working conditions.
3. Legislation for the benefit of Air Line Mechanics.

The Chairman of the assembly will be the National Secretary of the A. L. M. A.

CLIPPER PILOT *Sues* PAN AMERICAN

Pan American Airways was recently named defendant in a $100,000 damage suit filed in United States District court by Edward G. Schultz, former pilot of the clipper ship that crashed at Trinidad in September, 1935.

Pilot Schultz sustained permanent injuries, most serious of which was a fractured hip bone which incapacitates him as a pilot. At the present time he is residing on a grove near Goulds, Fla.

LAWRENCE TIBBETT LAUDS POWER OF UNITY

Lawrence Tibbett, leading baritone of the Metropolitan Opera Company and famous star of the screen, radio and concert stage, writing in the current issue of The Screen Guild Magazine says artists in all branches of the amusement world are beginning to wake up to the advantages of sticking together in organizations.

"Conditions are vastly different than before the War. To attempt to cope with the problems of today with the methods of 20 years ago is as disastrous as trying to get a green satin bustle into a new and extremely compact taxicab," writes Tibbett, who is president of the newly formed American Guild of Musical Artists, Inc.

Pointing out that organizations like the Actors Equity Association, the Screen Actors Guild, the Dramatists Guild, and his own Guild of Musical Artists offer the simplest means to adjust disputes between artists and their employers, Tibbett says, "I am sure the progressive business organizations of the theatrical and musical world hail the formation of these associations of artists with pleasurable anticipation. I am sure they see the tremendous benefits that are to be derived from a condition that makes the solution of all points of difference between themselves and their artistic colleagues possible on a large and simplified scale.

"All of these organizations are of artists and professionals who love their art and their profession above all else, and their purpose is to create conditions under which their art may more fully develop and prosper for everyone connected with it."

CURRENT EVENTS

(Continued from Page 1)

the following: "Committee on Air Commerce and Civil Aviation, to consist of twelve Senators."— January 6 by Mr. McAdoo.

S. Res. 16—Resolved, That rule XXV of the Standing Rules of the Senate be, and the same is hereby, amended by inserting on page 30, after the third line of paragraph 1, the following: "Committee on Civil Aviation and Aeronautics to consist of twelve Senators."— January 6 by Mr. McCarran.

S. Res. 75—Resolved, That the limit of expenditures under S. Res. 146, Seventy-fourth Congress, first session, agreed to June 7, 1935, to investigate certain airplane accidents and interstate air commerce, is hereby increased by $3,500.— February 1 by Mr. Copeland.

Recent numerous airplane crashes have resulted in a flurry of investigations, explanations, guesses (good and bad), and an air safety conference to be held on the 4th, 5th and 6th of February, at which a representative of ALPA will be present. Goaded by a frightened public and indignant press, it looks as though a belated safety program is the next step.

Pan American Conference

Pan American pilots, representing the Brownsville and Miami divisions, report that a conference with their company in New York, the 14th of last month, resulted in salary raises and improved working conditions.

Headquarters has been well occupied with employment contracts (which will be submitted to all councils for final approval in the February council mailing), studying the problem of air safety (on which it will shortly make some very definite recommendations to Congress), and taking care of a membership now over one thousand.

It is felt that the month of February will bring forth some noteworthy developments in all of the problems now facing the piloting profession. Many things are in such an embryonic stage that the outcome is as yet problematical.

The Association is carefully watching all angles and will continue protecting its members whenever and wherever their interests are at stake.

EASTMAN RECOMMENDS COORDINATION OF ALL TRANSPORTATION

(Continued from Page 1)

cause it is one of the normal ailments, there was a time when the railroad industry was showing some signs of incipient senility. It is something which happens to all of us, but the advantage which an industry has over an individual, at least so far as this world is concerned, is that it can be born again. That is what I think is happening to the railroads, and I rejoice that it is so. Of course, there are growing pains, but that is to be expected. In his remarks last week, Mr. Gormley spoke very kindly of the Commission, but he did exhibit some grief over what he called its "malnutrition diet". Yet I think he will agree that passenger fares of 3.6 cents per mile, to say nothing of Pullman surcharges, were somewhat too rich a diet for the patient, and I am hoping that he will agree, one of these days, that surcharges or nuisance charges, as many call them, were a little too indigestible a sauce to put on top of freight rates. However that may be, he may be sure that the notions of the Commission with respect to diet, like those of most physicians, are capable of change. The Commission is in favor of a well-balanced ration, and if experience shows in any case that the diet which it has prescribed is deficient in fats or sugars, I am sure that it will be disposed to do what it can to rectify the matter.

Spectacular Development in Air Transportation

There are some outstanding things about the present transportation situation. One is the amazing mechanical development for which modern science is responsible and which is continuing at a breath-taking rate. The results have been most spectacular in the air transport field, and that will, I think, continue to be so. No form of transportation can hope to compete with it in speed, and much of the disadvantage to which weather conditions give rise will be overcome, and sooner than we expect. If you will go back over the history of railroad wrecks right here in Massachusetts, as I once did, you will find that railroad transportation was once by no means as safe as it now is. The development of highway transportation has been so extraordinary that it is hard to believe that the peak of mechanical improvement has not been reached, but the fact is that modern science recognizes no peaks, only a continual ascent. We may be sure that the rapid improvement of ways and means of highway transport will continue.

As for the rails, the imagination of the country has been captured by what is now being done to increase the comfort, convenience and speed of railroad passenger travel. It is not so generally known that a similar revolution is under way in the hauling of freight. The difference in speed between freight and passenger service which has so long been characteristic of the railroads is beginning to disappear, and before very long we shall see great changes in terminal operations, of which pick-up and delivery service is a forerunner. If I learned nothing else in my brief term of office as the first and last Federal Coordinator of Transportation, I got to know that the opportunities for mechanical improvement in railroad operations are very great. You will be surprised at what you are going to see.

I can say less about the improvements in water transportation, probably because I am not well informed as to the facts. I know that there have been great improvements in barge operations and in the vessels which handle commodities in bulk, like coal, ore, and oil. My guess is, also, that when some genius devotes his attention to the boats which operate in such service as the old Fall River route, he will find ways and means of restoring much of the popularity and prestige which they used to have.

Must Utilize Research

The fact is that no form of transportation can expect to prosper, now or in the future, unless it utilizes all the resources of modern engineering and scientific research and shapes its organization to that end. And to be effective, it must for this purpose be an organization of the industry and not of individual carriers. What Mr. Gormley said to you last week indicates that the railroads are beginning to appreciate that fact, although in my judgment they have not yet gone far in this direction, and are approaching the job timidly where they should be bold.

Traffic Unlimited

This brings me to the second outstanding thing which I wish to mention about present transportation conditions, and that is that it has been borne in upon us that there is no known limit to the potential traffic which exists to be carried. It is a matter of service and price. Henry Ford proved this when he developed the low-priced automobile, and at the same time he gave a very convincing demonstration of the way in which the mechanization of industry can be used to increase instead of decrease employment. The way, of course, is to translate the mechanization into better goods or services at lower prices, and thus magnify the ability to consume along with the ability to produce.

The great hope for prosperous carriage lies in continually better service at lower prices justified by lower costs. We know that improvements in means of transportation have increased the travel habit of the American people five or six fold. It is less easy to believe that there is the same opportunity for increasing the movement of goods, but if you will stop to think what the coming of the railroads did in promoting such movement, I think you will see that the opportunity does exist.

The third and last outstanding thing about the transportation of today to which I wish to direct your attention is the tremendous increase in competition. Transportation is far more of a competitive industry than it used to be, and there lies the reason for much of the recent improvement in service and facilities. Following the principles of the old laissez faire economy, it might be argued from this, and some have argued, that the need for public regulation has ceased and the thing to do is to abandon it and let nature take her course. The fact is that, just as there are dangers in monopoly, so there are in competition, and particularly when we are dealing with a service like transportation, upon which the life and economy of the present day basically depend.

Danger in Competition

The trouble with competition is that it can progress from the stage of stimulating rivalry to cutthroat warfare, and when there is warfare some one is going to be hurt, and it may be a lot of innocent bystanders. Such warfare in transportation endangers not only the carriers themselves and those who have their money invested in them, but the public safety, the welfare of employees, and even general business conditions and the proper development of the country. No matter how desirous the majority of carriers may be to maintain good standards of safety, wages, and working conditions, there will always be a minority who will be ready to sacrifice such things in the warfare of competition, and unless they are restrained, they will sooner or later force their low standards on the entire industry.

Let me illustrate, also, the danger with respect to business conditions. You will recall that when competition of the railroads with each other was unrestrained, discriminations in rates and service ran rife, and the benefits, naturally, went to the big shippers and the big communities. It was in those days that the Standard Oil and other trusts were created. The little shippers and the little communities suffered, and the development of the country became unbalanced and distorted. The fact is, also, as we are beginning to find out, that the present competition in transportation is gradually recreating similar conditions, and unless it is brought under adequate control and restraint, we shall have the same unfortunate results. A symptom is the drive of the railroads to emasculate the famous Fourth Section of the Interstate Commerce Act, which prohibits charging less for a long haul than for a short haul over the same line or route without the permission of the Commission. It was situations such as that Section was designed to correct which were one of the chief reasons for the creation of the Commission in 1887, and which were putting competing water lines out of business at the expense of those who had to pay the higher rates for the shorter hauls.

Government Control

The only authority which can bring competition under proper restraint, without doing away with it, and prevent these disastrous results is the authority of the Government, and it is a job which calls for statesmanship of a high order. I say that, not by way of paying tribute to those of us who have the job to do, because we may not measure up to it, but to show you that we do appreciate the magnitude and importance of the undertaking. It is a job of curbing abuses, maintaining standards, promoting good order and stability, encouraging cooperation, and doing it all in a way which will convince managements and employees and investors and shippers and travelers, who are all breeders of controversies, that there is at least an intent to be honest and fair, and to hear and weigh evidence impartially, and an ability to function with a reasonable degree of sound sense and efficiency.

Growth of I. C. C.

It is interesting to me the way this idea of public regulation has grown. For a long time after the Interstate Commerce Commission was created, it was in a more or less constant struggle in the courts with the railroads which it was regulating, and when Theodore Roosevelt undertook to make rate regulation effective by amendments to the Act, he met with their bitter resistance. It is different now, not only with the railroads, but with the other carriers. They have become, for the most part, the proponents of regulation, as I think is well shown by what their representatives had to say to you last week. The point is also illustrated by our experience with the Motor Carrier Act, 1935.

That Act imposed upon the Commission one of the most difficult jobs it has ever undertaken. Railroad regulation developed slowly. It is a very different thing today from what it was at the start, and over a long period of years several important amendments were made to the Act before it reached its present form. Springing from that slowly-built foundation, the Motor Carrier Act suddenly imposed a full-blown system of regulation upon a form of transportation which was just emerging from infancy, which is very different from rail transportation, and which was full of confusion, not to say chaos. We had to create an entirely new organization under civil service procedure, fitted to the job as well as we could make it, and start in applying this full-blown system of regulation to many thousands of bus and truck operators scattered all over the country, a large part of whom operate only a single vehicle, and most of whom were utterly unaccustomed to regulation, at least of that description. There have been hundreds of new questions, many of them legal, for both the operators and ourselves to consider; the Act is so drawn that the peak of the work comes at the very start; and we have been handicapped by the difficulty of getting an adequate appropriation at a time when the country is crying for a balanced budget.

Lack Funds

We have not done all that we would like to have done and hoped to do, and we are in danger of very serious congestion in various phases of the work, particularly if we cannot get adequate funds; but I feel that we have made good progress, all things considered, and I know that we have as faithful and hard-working a staff of employees on this job as I have ever had the good fortune to be associated with, and I have had no reason to complain in that respect in the nearly 23 years that I have been in the public service of the nation or the Commonwealth of Massachusetts. But the point which I wish to emphasize is that in this work we have so far had, not resistance, but hearty cooperation from the great bulk of the motor carriers, and the main complaint which they have to offer, and for which I do not blame them, is that we have been slow in making the regulation effective and curbing the irresponsible and chiselling operator who is demoralizing the industry. Right at this moment we have before us a petition from the Motor Truck Rate Bureau of Massachusetts asking that we institute an investigation of truck rates in New England and fix them by order. We have not yet acted upon that petition, but I hope that we can see our way clear to grant it, for there is, I think, no part of the country in which more intelligent and painstaking work has been done in endeavoring to find out what truck rates ought to be than by the operators in this very Commonwealth.

Coordination of All Transportation

I hope to see the time come when the jurisdiction of the Commission will be extended more fully than it now is over the entire field of transportation, including water and air. This is not because I want the Commission to be aggrandized, for we have reason to know that any pleasant feeling of importance that might be a by-product would be much more than offset by the hard work involved, but because the transportation system cannot be dealt with intelligently and well except as a unit. Every form of transportation is vital to the good of the country and has its place, but they are all interrelated, the parts of the machine must be made to work smoothly together, and progress in coordination will come faster if control is centralized in one place.

That brings me to my closing observation. In a few weeks the Commonwealth will celebrate its fiftieth anniversary, and it is not inappropriate to look back a little on its history. As I have said, the remarks made to you last week were kindly, so far as they referred to the Commission, and it was of course a pelasure for me to read them. I have read many other comments, from time to time, which I did not enjoy so much, but I have always consoled myself with the conviction, probably inherited from my New England ancestors, that criticism is good for the soul of a public official and no doubt, like medicine, is more effective the worse it tastes. But while the Commission has not satisfied everybody, and sometimes very few, it has a history some features of which are worth recalling.

Commission Quasi-Judicial, Quasi-Legislative

Not all understand what kind of an agency the Commission is. It is primarily an arm, not of the executive branch of the Government, but of the legislative. As the Supreme Court recently said in a unanimous opinion in regard to another similar agency, its duties are "neither political nor executive, but predominantly quasi-judicial and quasi-legislative." It is "charged with the enforcement of no policy except the policy of the law." It "cannot in any proper sense be characterized as an arm or an eye of the executive. Its duties are performed without executive leave and, in the contemplation of the statute, must be free from executive control." It is an "administrative body created by Congress to carry into effect legislative policies embodied in the statute in accordance with the legislative standard therein prescribed, and to perform other specified duties as a legislative or as a judicial aid." In the case of the Interstate Commerce Commission the duties which have specifically been found by the Supreme Court to be legislative far outweigh those which are judicial in their nature.

The power to prescribe railroad rates for the future, for example, is a legislative power, and sometimes State legislatures have exercised it directly. Obviously, however, such direct use of the power is generally impracticable, so that the legislative bodies have resorted to the expedient of laying down the standards which they want followed, and then creating an expert body to apply those standards. And in order that this task may be done with impartiality and justice, they have made these legislative agencies nonpartisan, removed them from politcal influences, and made it necessary for them to base their decisions upon evidence taken in proceedings openly and formally conducted.

Clear of Politics

That is the kind of an agency the Interstate Commerce Commission was intended to be, and the reason for its being. Whatever the faults of the Commission may have been, and there have been many, it has never, I believe, been accused of any lack of integrity, it has kept its skirts clear of politics, it has endeavored to base its decisions on records of evidence made in open, public hearings, and it has fully reported the reasons for its actions so that the world might judge of their soundness. In other words, it has been faithful to its trust, as it understood it to be, and to the best of its ability. We are proud of that part, at least, of our record. Personally I think that the Commission is in need of some measure of reorganization, if it is to be given larger duties, but I sincerely hope that in no reorganization that may be undertaken will anything be done that will impair the essential nature of the institution, give it the slightest political tinge, or endanger the characteristics which have distinguished it during the past half century.

HUGHES SETS *New* SPEED RECORD

Setting a new west-east transcontinental speed record, Howard Hughes sped through the substratosphere from Los Angeles to New York in 7 hours 28 minutes 25 seconds. His average speed over the 2,490 miles was 332 miles per hour. This is the greatest sustained speed flight ever made.

Hughes bettered his old mark by approximately two hours. The former record was 9 hours 25 minutes 10 seconds, an average speed of 265 miles per hour.

HAVE YOU?

HAVE YOU PURCHASED YOUR EMBLEM? If not, it is waiting for you at Headquarters. The cost is fifty cents. You may in this way, identify yourself as an AIR LINE PILOT in good standing.

AIR LINE PILOTS' TESTIMONY AT SENATE SAFETY HEARINGS

The subject of increasing safety on the air lines has been given thorough and extensive study by the Air Line Pilots Association over a long period. Representatives of the Association have appeared at every opportunity in Washington and elsewhere to testify, giving the opinions of the pilots who are actually doing the flying, as to what should be done to increase safety on the air lines.

The following quoted testimony was presented by the Association before an air safety subcommittee of the Committee on Commerce, United States Senate, headed by Senator Copeland, during hearings held intermittently throughout the entire last session of Congress. Because of the many recent airplane accidents, it was deemed timely and beneficial to reprint this material at this time in The AIR LINE PILOT. Unfortunately very little has been done to date to carry out the pilots' recommendations made approximately a year ago to increase air safety.

Because of the length of this testimony, it will be continued through several issues. Mr. Behncke is referred to as B and Senator Copeland as C.

* * *

Statement of David L. Behncke, President, Air Line Pilots Association, Chicago, Ill.

Chairman Copeland: Will you please give your name and your connections?

Mr. Behncke: My name is David L. Behncke, and I am president of the Air Line Pilots Association.

C.: Do you know anything about safety in aviation?

B.: Senator, I have been in aviation for 20 years, and I should know something about it.

C.: I believe you said you are president of the Air Line Pilots' Association.

B.: Yes, sir. And this organization has in its membership practically 90 per cent of the air-line pilots in this country, in both domestic and foreign operations.

I have been flying for 20 years and have, you might say, practically grown up with the industry. I have had 10,000 hours in the air and have been piloting on air lines for 8½ years.

At the present time I am representing the Air Line Pilots Association, which is an organization 5 years old, and as president of the organization I have been on the receiving end of the complaints and comments of all of the pilots throughout the Nation for approximately 5 years.

As the result of that I have accumulated quite a complete knowledge of the situation, and I can assure the Senator I will stick closely to what I think should be done to improve safety on the air lines. I have quite a bit of material to present, and, to save time, I have condensed it as much as possible.

To begin with, I will say that this investigation is timely, and certainly necessary, as the time has come when something must be done, because we have been having too many crashes on the air lines. I was very much pleased when I heard that the Senate had appointed an investigating committee to go into the matter.

New Regulatory Agency Needed

I think the main trouble is that the air-transportation industry has outgrown the present Government regulatory vehicle, which is the Air Commerce Act of 1926.

We have only to look at our air-network map to realize the tremendous regulatory, proper-maintenance, and proper-inspection problems we are now facing.

In 1926, we had in the neighborhood of 8,000 route-miles. Now, we have approximately 28,000 airplane route-miles, and this figure is ever increasing. Today we are flying approximately 160,000 scheduled miles each day.

C.: How many miles is that?

B.: 160,000 scheduled air miles each day. The Air Commerce Act of 1926 is, primarily, one-man controlled. The director and practically all the heads in this department are appointed politically, and change with each administration. I am not in politics and do not know very much about it, but the main objection that the pilots have, we feel there is not sufficient continuity of effort, and certainly political interference should not be interposed where public safety is such an important factor.

In other words, one administration will come in and may build up a fairly good system, then the heads will change with another administration, and the benefit is lost.

C.: Did you hear the Interstate Commerce Commissioner this morning?

B.: Yes, sir; I did, and I was very much impressed with his testimony.

Wrong System

We cannot cope successfully with the tremendous problem of properly regulating the large air-network system we have developed in this country under the provisions of the Air Commerce Act of 1926. I do not wish to be misunderstood. It is not so much the fault of the individuals holding positions in the Bureau of Air Commerce, as it is the fault of the system and methods provided for under the present Air Commerce Act.

There have been too many crashes on the air lines during the past several years, and especially during the last year. This is all unnecessary. Air travel is safe if properly handled. In one quarter of our air network in less than a month, we have had six accidents, resulting in the death of 18 people and serious injury to one of the surviving pilots. It was reported to me that the known cause of four of these accidents was motor failure. The question is, Why? Motors can be made to function safely by proper maintenance and inspection, to a point where forced landings are almost completely eliminated. This can be done, because it has been done in the past.

C.: That was four cases out of how many when the accidents were due to motor failure?

B.: Four cases out of six due to motor failure. Motor failure could be practically eliminated, because this has been proven.

At this point, I would like to enlarge a little bit. A number of years ago I flew on air lines; one was the Northwest Airways; about 7 or 8 years ago, as I remember it, we had only three pilots and three ships, so we all had individual ships. I had the same type of motor that Lindbergh used, and I flew that motor 650 hours without ever hearing it miss.

I went from that position back in the Army several years, then I went to work for the Boeing Air Transport. I flew for hundreds of hours for the Boeing Air Transport without being forced down by motor trouble.

Maintenance and Inspection

That proves that motors long ago had been built so that they will run if they are properly inspected and maintained.

Let us look into the mechanical maintenance and inspection situation further. I have no figures here as to actual dates, and so forth, but I believe that if the investigators for this committee will go out on the air network and contact those who actually do the work, they would learn many things the elimination of which would also eliminate accidents. I think they would find that many of the mechanics are very much underpaid. I think they would find that there are a number of mechanics and helpers working around the airplanes that are inexperienced. I think they would find that many of the mechanics and other air-line technicians are unlicensed. They should all be licensed to determine their fitness and qualifications. This all has a direct bearing on public safety.

To say the least, the airplane is a very intricate and highly technical piece of machinery. The first rule of airplane engineering is to build planes light but strong. When you put a piece of machinery such as an airplane into hard usage, there is a paramount need for thorough maintenance, and I think one of the most important things is a thorough inspection before a ship goes on its regular runs.

In other words, the airplane is built light and strong, but when you put it to hard usage, when it fails, it fails quickly. This is why we must have thorough and frequent inspections.

C.: Do I understand there is a lack of such inspection as you are speaking of?

B.: I think there is.

C.: Whose business is it to see that that is done?

B.: It is divided between the Bureau and the companies. There is no uniform system that is now available. We say there should be a system of inspection similar to the railroads, so that it will be properly and completely done and the whole situation kept well in hand at all times.

C.: Is it your judgment that it is a function of Government, and that the Department should do that?

B.: I think the inspection should primarily be done by the air lines, but I think the Government should set up a system so infallible that they have a definite check to see that inspection is being properly performed.

C.: That is along the line of what the Commissioner testified this morning. Their own inspectors go out and meet the locomotive supervisors of the different lines of railroad, and there is a cooperation there, but primarily the responsibility rests back on the Interstate Commerce Commission to see it is done.

B.: That is right.

C.: Is that the law?

B.: I am not thoroughly familiar with the exact detail of the present law governing inspection.

C.: Is it, Mr. Vidal?

Mr. Vidal: They are doing just what you suggest they should do. Our maintenance inspectors are at the main air-line bases, and they have been cooperating with them for years. That is one of our duties according to law, but maintenance itself is done by the air lines.

B.: The point I make is that whatever the Department of Commerce is doing, it is not as thoroughly infallible and complete as on the railroads, and we feel that it should be.

You might ask the question, What systems of inspection are in effect on the air lines today; and are they made at sufficiently frequent intervals; and are they adequate and infallible? Certainly an air-line inspector should be thoroughly competent and highly qualified in all phases of airplane construction.

Licensed Inspectors

Do they meet these qualifications? I think you will find that in certain instances they do, but in many instances they do not. The airplane inspectors on our air lines should be all licensed so as to determine without question their qualifications, including their background and experience.

The question might also be asked, To whom should these inspectors be responsible?

I think the answer is that they should be both responsible to the companies they work for, and to the Government, for the proper performance of their work. An inspection system should not be so set up that outside influence cannot be brought to bear on the work of the inspector. In other words, the inspection department should have the authority to place equipment out of service until it is properly repaired and again made serviceable.

Certain of the air-line companies are flying their equipment long distances, division after division, and in some instances, from coast to coast. The question naturally suggests itself. Are these ships being properly inspected, given proper maintenance, and gone over mechanically at sufficiently frequent intervals to insure safety?

When a ship goes from coast to coast, or for long distances, there is no chance to work on this airplane other than to give it quick service while mail and passengers are being transferred at divisions. Pilots recently stated to me that the equipment was being flown so hard on a certain line that the motors never really have a chance to cool off.

Frequency of Inspections

C.: You asked a question there, just a few words back, as to whether these inspections are being made. What was that question?

B.: Are the inspections being made frequently enough?

C.: What is the answer?

B.: I do not think they are. As a matter of fact, these airliners are in some instances being flown from coast to coast, and when planes go almost 3,000 miles and you stop them en route only long enough to put in gas and oil, you cannot properly inspect this equipment.

C.: When I make a transcontinental trip on the railroad, every time they stop at a division point a man goes over the engine with a hammer and tries every wheel to see if it is correct, and he makes a careful inspection to see that the locomotive is correct, and the question I ask is, Is that the sort of inspection you think ought to be made at the division points of the airplanes?

B.: One of the questions that the companies have raised, on the sleeper planes, when they put a passenger to bed, they do not like to awaken him to change planes going from coast to coast, but I think they should be required to hold those ships at regularly designated points and have a thorough inspection made, the same as the railroads do.

C.: That would not necessarily mean the awakening of the passengers, would it?

B.: No; I think they could do it in 30 to 45 minutes if they would stop the planes at various points en route and put two or three men on it and go over all vital parts.

For instance, propellors breaking have caused crashes, and they usually do not break all at once, but they develop little cracks which you can see by close inspection, before they break completely, and there are a lot of parts on the plane that are in the same category.

C.: Is it your opinion that such inspection as you suggest here is not being systematically made?

B.: That is right.

C.: All right; just go ahead.

Adjusting Carburetors

B.: Speaking of coast-to-coast operation, we have recently run into another obstacle, and it is that the carburetor adjustments that function satisfactorily in the desert regions of our lower western territories will give serious trouble when they reach the northern and eastern sections of the country. In other words, the trip is so extensive, and through such a great number of extreme temperature and humidity changes, it would be impossible to properly adjust and cowl motors so that they will function properly during the entire trip. This is an obstacle that has been discovered but recently, and it has a definite bearing on public safety.

C.: I would like to ask you about that.

B.: That is a matter of adjusting the carburetors to abruptly changing temperature conditions. The main trouble is in idling the motors in the glide and landing. Motors that will idle perfectly in a warm climate will in many cases stop running completely in the glide and landing when a colder climate is reached. The result is that when and if the pilot needs his motors in an emergency they choke up and the result is usually another accident.

Another obstacle is, in warm climates you do not cowl the motor over so much, but when you get in the colder sections they are covered over a great deal more with cowling to keep them running at the proper temperatures, especially our present-day air-cooled motors.

Should Change Planes

C.: Your idea is that they should change planes more?

B.: I think they should change planes at least once on a transcontinental trip, and even that would be cutting corners.

C.: Do you recommend that should be the rule?

B.: Oh, yes; absolutely at least once.

C.: Your judgment is that to attempt to take a plane from coast to coast makes too heavy demands upon the machinery and the probabilities?

B.: That is right. The mechanics and inspectors do not have a chance to look at the planes or work on them, and there is too much chance of a slip-up; and things might develop that if you inspected the planes more often you would find and correct defects, thereby avoiding serious accidents; and we would also get away from the temperature-change danger in motor adjustment and cowling.

C.: What would be the dividing line if, as you say, there were to be two planes to cross the country?

B.: We have three transcontinental air lines; and I think the transcontinental plane changes should be, as a rough example, somewhere about Fort Worth, Tex., and probably Omaha, Nebr., and Kansas City, Mo.

C.: Flights would be established so that it would be daylight trips?

B.: It does not make any difference; because the air lines function the same at night as in the daytime.

C.: What about the passengers?

B.: They could arrange the schedule to more or less accommodate the midway equipment change stops on transcontinental runs.

C.: Do you think that plan would make any greater safety?

B.: I think it absolutely would. As a matter of fact, the coast to coast type of operation I have described is not in effect on all of the transcontinental airways. It is, however, being done on certain of the transcontinental systems.

C.: That is, coast to coast?

B.: Yes; coast to coast. They call it the three-ship system—one ship going each way and one in reserve—but naturally this is not enough equipment to insure safety.

C.: I suppose the reason they have not sufficient equipment is a matter of dollars and cents.

B.: I think possibly it is; but if it is a matter of dollars and cents, I think they should be given a little more mail pay so that they could set up a properly equipped operation and then be compelled to do so in the interest of public safety.

C.: All right; just go ahead.

Pilot Should Check Inspection

B.: Under the present system of airplane inspection the pilots are actually not aware of the true mechanical condition of the planes that they sign clearance for as being O. K. before they actually take off on their regular trips. Some system should be worked out so that the pilot could actually check over inspection sheets before accepting equipment as O. K.; and if this is not possible it is all the more reason that whatever system of inspection is placed into effect should be so infallible that it should not be necessary for the pilot to worry about the condition of the ship and should take for granted that the ship given him to make his trip with is 100 per cent mechanically O. K.

C.: Let me ask you, are these pilots qualified, so that if they take the ship apart, they would know the condition?

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TRIAL AND ERROR

(Continued from Page 2)

when trial and error method is employed, the error often results in loss of life. Experimental equipment should be removed from the airways and the airliners carrying human cargo. The air transport industry needs a proving ground where everything that is developed may be thoroughly tested as to its dependability and practicality in all types of weather and over all manner of terrain before it is actually placed on an air line.

Would it not be using better judgment to first spend a small portion of the money necessary to improve airway aids before expending staggering sums for equipment that is confessedly inadequate and unreliable? Why not give the ingenuity of science and engineering a chance to develop a more reliable radio beam and other aids to air navigation, rather than proceed blindly by spending great amounts on something which at its best is not good enough?

No one will deny that considerable finance is necessary to add to and improve the aids to air navigation, but the least the industry can do is to go forward intelligently, which is trial BEFORE error.

The theory that air transportation is new is itself a dangerous one. Compared with other modes of transportation it is of course young, but we are beyond the period where we can use its youth as the excuse for accidents. Behind the controls of our ships and in executive positions on our air lines, we find men "sprinkled with gray" who have given their entire useful lives to the development of the industry. It is a falsity to regard air transportation as anything but a recognized, well-established mode of travel. The fact is that it has grown so rapidly that many are still prone to think mistakenly of it as a child.

The control and regulation of air transportation has not kept pace with its growth and this has resulted in the chaotic condition that exists today. The broad "fostering and promotional" provisions of the Air Commerce Act of 1926 are no longer adequate to cope successfully with the problems of an established industry. The time has come to give a grown-up industry the benefit of grown-up laws.

To sit back and view this entire picture leaves one with a definite feeling of helplessness. There must be a definite placing of responsibility and uniform procedure throughout the industry for handling the many problems which have such a vital bearing on safety.

If a real measure of public safety is to be attained, we must secure the enactment of a law creating sharp, clean-cut and enforced regulatory control of air transportation. The control must be removed from political and other influences and placed in an agency whose functions are quasi-legislative and quasi-judicial, completely apart from any tinge of politics.

In the records of Safety in Railroad Transportation, we find that not so long ago, before the railroads were placed under the present strict regulation of the Interstate Commerce Commission, accidents were so numerous that the public feared rail travel as many now fear air travel. For the purpose of illustrating the effect of railway safety laws when properly applied, we quote from the Fiftieth Annual Report to Congress of the Interstate Commerce Commission:

Authentic records as to the number of casualties caused by defective boilers and their appurtenances prior to the enactment of the Locomotive Boiler Inspection Act are not available, but Table A shows a comparison of the number of persons killed and number of persons injured as a result of failure of some part or appurtenance of the locomotive boiler for the first year in which the act was operative and for the year ended June 30, 1936.

TABLE A

—Boiler and its appurtenances only—	Year ended June 30 1912	1936
Number of persons killed.....	91	10
Number of persons injured.....	1,005	80

* * *

The total number of persons killed as a result of failures of locomotive boilers and their appurtenances in the period shown was 717, and the total number of injured was 8,771. If the casualties had occurred at the same rate throughout the period as they occurred in the first year in which the act was effective, there would have been 2,275 persons killed and 25,125 injured.

The general attitude was to subordinate the making of needed repairs to the requirements of convenience. Although the railroads had inspection rules that were adequate for the purpose, little if any attempt was made to make immediate repairs if any inconvenience would be caused thereby, and, as with the boiler, locomotives in known bad condition were continued in use until application of needed repairs seemed to be more convenient or until failure occurred which often resulted in deaths or injuries. The attitude at that time is well illustrated by the following excerpt from a letter from the receiver of an important railroad to a then assistant chief inspector of this Bureau:

PILOTS TESTIFY SENATE SAFETY COMMITTEE

(Continued from Page 7)

B.: I think practically all of them would be, because most of them are mechanically inclined and they have nearly all been flying many years, and they come in contact with the planes practically every day, and they in this way learn to know all of the intricate parts of the plane, especially the control system, and such as that.

C.: Is there some advantage for the pilot to know about the machine?

B.: Oh, yes; a decided advantage. I think you will find there are very few air line pilots that do not possess a quite thorough knowledge of their machines. As a matter of fact, however, when the pilot comes out to the field to take out his run he gets into his machine, and so far as he knows, it is all right, but he does not know for sure. He does not know definitely, and he has no way of knowing, and as far as the plane being properly serviced and inspected, that is the duty of somebody else.

C.: That is the reason you say the mechanicians and all others concerned with the operation of the plane ought to be qualified persons?

B.: Yes, sir; that is the reason I make that statement, and I think they should be qualified and properly licensed.

The Interstate Commerce Commission has been handling and studying transportation problems from the standpoint of safety for many years. I have here the laws that have been enacted to insure public safety on the railroads, remembering that while the railroads, too, have had many crashes in the past, they have become increasingly safe with years and did, during the year 1935 operate their passenger service over the entire United States without serious accident.

Stretch-out System

B.: The carriers claim that they are short of equipment. This is probably true, but if shortage of equipment is going to interfere with public safety, we are going to have to get more equipment. In other words, there is too much of a tendency on the part of the air lines to crowd equipment, commonly referred to in other methods of transportation as the stretch-out system.

If a plane comes into a station with things wrong with it, it should be fixed, but they will not hold a ship that may be needed, so they usually stretch a point and send it out on the trip again. But if there is sufficient equipment, they can put another ship on the run and put the defective one in the hangar and fix it up so that it can be used safely.

C.: I remember in the Cutting accident, when the plane left Albuquerque the radio would not work — (that is the transmission would not work)—and would you include in your regulations, or in your method of inspection oversight, that the radio and every feature should be in working condition?

B.: Whenever a plane leaves the ground it should be perfect in every detail, because when something happens up in the air it is different than when it happens on the ground. If you are in a train or car and something happens, it stops when the momentum spends itself, but when things happen in the air it is a long way down, and that is the reason it must be perfect.

If public safety is going to be served, we are going to have to have regular division points of so many miles, and when an airplane gets to this division point it will have to be placed in the hangar, completely inspected, and serviced, and gone over mechanically, the same as locomotives are gone over when they reach the end of their run. Common sense tells us that this is the only way it can be done in order that we may be sure the equipment is receiving proper care and inspection.

Dispatchers Underpaid

All of these things that I have told you have a direct bearing on public safety.

The air line dispatchers, who have to do with the dispatching of airplanes, and who are in a position of great responsibility, having much to do with the safety of the air-traveling public, are surprisingly underpaid. A recent Interstate Commerce Commission survey shows that they receive on the average considerably below $25 a week. This low pay could not possibly attract the type of man, with background, experience, and good judgment, necessary to properly carry on the important duties that fall upon the shoulders of the dispatcher.

In other words an air line dispatcher operating in the air line service is a very important individual. He should have long experience and background in air operation, because with an air line dispatcher rests a large part of the responsibility of sending the planes out; he has considerable to do with the movement of the planes. As a matter of fact, he really should be an ex-pilot, because he should have long experience in the operation of planes.

C.: How much does a pilot get?

B.: The pilots receive an average of between five and six hundred dollars a month.

C.: It would have to be a very ex-pilot to take a job at $25 a week.

B.: That is correct, and it does not attract the right kind of people. If they would raise the salary to some point which would attract the older pilots, who would probably figure on doing something like that when they finish with active flying, they certainly would get a class of dispatchers who would be able to perform their duties properly.

Dispatchers Should Be Licensed

The air line dispatchers are at the present time unlicensed. The Government has no way of knowing what their qualifications really are. The pilots have repeatedly recommended that they be licensed, after passing satisfactory prescribed examinations to determine fitness and qualifications.

In other words, the Government should know that these people who are dispatching planes are properly qualified to perform such duties involving the safeguarding of human life.

C.: Those men are employed by the air lines themselves, are they not?

B.: Yes, sir.

C.: And it is your recommendation that there should be a regulation in that case to make certain that the men who are employed are qualified?

B.: Yes; and I think that could be accomplished by requiring proper examination and licensing at the time they are employed.

C.: That would not be unusual because we have those examinations for officers on steamships, and so forth. They are privately paid, but they cannot be employed unless they are licensed.

B.: Yes, sir; Mr. Chairman, and we feel the same way about the air line dispatchers.

(Continued in February issue)

"It is a very different thing for an Association to adopt rules or standards to which the railroads shall work, or for railroads themselves to adopt rules from which they may themselves vary, and having a law which the Federal Government at Washington may enforce LITERALLY and ABSOLUTELY."

The expressions, "THAT'S GOOD ENOUGH," "HURRY UP AND GET HER OUT," "WE WILL GET THAT NEXT TRIP," and kindred expressions were very common at that time and were responsible for many accidents caused by defects in the locomotives.

Our endeavor has been to have necessary repairs made promptly and properly, and the wisdom of this policy is illustrated in the improved condition of the locomotives, enabling them to make longer runs; reduction in the number of killed and injured due to failures; and greatly increased mileage per engine failure.

During the fiscal year 1917, the first full year after the law was extended to include the entire locomotive and tender, there were 616 accidents, resulting in 62 killed and 721 injured, while in the fiscal year ended June 30, 1936, there were 209 accidents, resulting in 16 persons killed and 215 injured.

The results obtained by this Bureau in the quarter of a century of its existence in promoting the safety of the employees and travelers on the railroads, due largely to regular and more thorough inspection and repairs, evidence the soundness and value of the legislation. Due credit is also given to the tireless and conscientious attention to their duty of our corps of inspectors throughout the life of the locomotive boiler inspection law.

* * *

It is conceded that Railway Inspection Laws have no direct connection with air transportation but at the same time the above excerpt gives a practical illustration of just what I. C. C. regulation has done to increase safety in this one phase of rail transportation equipment. There is every reason to believe that the same results can be accomplished in all phases of air transportation having to do with safety, if the regulatory functions of this industry are placed under the control of an Air Transportation Division of the Interstate Commerce Commission.

Pilots are firmly convinced that proper safety legislation providing for the lifting of the present air line regulatory functions out of the Department of Commerce and placing them in a separate Air Transportation Division of the I. C. C., will result in a much lower percentage of air line accidents.

The trial and error methods must be eliminated. Instead, all experimental developments must be thoroughly tested and proved before they are placed on scheduled air lines. This is the only sound policy to follow.

Properly conducted experimentation, development, and trial will prevent errors. In air transportation, errors and fatal accidents are too often synonymous.